

534 Rec'd PCT/PT 03 JUL 2000

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U.S. DEPARTMENT OF

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TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER

2182 US

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/582775

INTERNATIONAL APPLICATION NO.  
PCT/IT99/00085INTERNATIONAL FILING DATE  
9 April 1999PRIORITY DATE CLAIMED  
2 November 1998TITLE OF INVENTION AUTOMATIC DEVICE FOR THE DELIVERING OF VIDEO SIGNALS, WITH  
A HIGH CAPACITY OPTICAL DISKS RECORD

APPLICANT(S) FOR DO/EO/US

Luigi CARAMICO and Mario MENE'

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.  
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

Request form.

Search Report.

Application Data Sheet.

U.S. APPLICATION NO. 09/582775

INTERNATIONAL APPLICATION NO.  
PCT/IT99/00085ATTORNEY'S DOCKET NUMBER  
2182 US17. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):

Neither international preliminary examination fee (37 CFR 1.482)  
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO  
and International Search Report not prepared by the EPO or JPO ..... \$ 970.00International preliminary examination fee (37 CFR 1.482) not paid to  
USPTO but International Search Report prepared by the EPO or JPO ..... \$840.00International preliminary examination fee (37 CFR 1.482) not paid to USPTO  
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$690.00International preliminary examination fee (37 CFR 1.482) paid to USPTO  
but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$670.00International preliminary examination fee (37 CFR 1.482) paid to USPTO  
and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$96.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

CALCULATIONS PTO USE ONLY

\$ 840

Surcharge of \$130.00 for furnishing the oath or declaration later than ☒ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 130

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	7 - 20 =	0	x \$18.00	\$ 0
Independent claims	1 - 3 =	0	x \$78.00	\$ 0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$
TOTAL OF ABOVE CALCULATIONS =				\$ 970
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				\$
SUBTOTAL =				\$ 970
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$
TOTAL NATIONAL FEE =				\$ 970
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$
TOTAL FEES ENCLOSED =				\$ 970
				Amount to be refunded: \$
				charged: \$

a. ☒ A check in the amount of \$ 970 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required by  
37 CFR 1.16 and 1.17, or credit any overpayment to Deposit Account No. 25-0120. A duplicate  
copy of this sheet is enclosed.NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR  
1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

July 3, 2000

SEND ALL CORRESPONDENCE TO:

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Benoit Castel

NAME

35,041

REGISTRATION NUMBER

534 Rec'd PCT/PTC- 03 JUL 2000

"AN AUTOMATIC DEVICE FOR THE DELIVERING OF VIDEO SIGNALS, WITH A HIGH CAPACITY OPTICAL DISKS RECORD"

The present invention concerns an automatic device for the delivering of video signals with a high capacity optical disks record.

It is known that at present all video servers are founded on the rigid disks technology and consider a structure comprising a computer provided with a BUS with high services that allows the passage of a considerable quantity of data. The storage units are usually based on high speed hard disk systems SCSI and the informations (in this particular case, the films codified according to the MPEG-2 standard) are stored on disks according to the "striping" technique. The present video servers are provided with input/output interfaces, for being compatible with the other television broadcasting apparatuses, typical for the television broadcast ambient (compound analogic signal, components or non compressed digital D1).

The use of above mentioned video server systems for realizing services of the NVOD kind shows considerable disadvantages:

- the cost: first of all, the storage of a considerable quantity of video films requires a great space and this affects the extremely high costs of the present systems that make use of hard-disks as a storage support;

- slow loading and updating of the contents: the need of reducing the costs within reasonable limits requires the need of dimensioning the vide servers in such a way as to contain only those films that are to be broadcasted, storing all other films onto a tape and performing the loading thereof only when they are to be used. The loading of films from a tape is very long and may be compared to the duration of the films to be loaded. This is due to the speed of the tape supports as well as to the storage technique on hard-disks as well as to the need of not to interfere with the broadcasting of the films that are stored on the same hard-disks and which therefore must be read before the writing process of the new film. This last problem, infact, limits the number of the films that may be contemporarily loaded, to one or maximum two films; consequently, the updating of the content of the whole server may also last a plurality of days;
- rigidity of use: a direct consequence of the slowness in updating the contents is the lack of felxibility in the composition of the NVOD channels programming which necessarily are limited in proposing again also for long periods the same programming without the possibility of proposing a more efficient commercial policy or responding in a more appropriate way to the requests of the users. Due to the limited capacity of the storage technique, besides the slow loading, it is necessary to observe a rather rigid mix in the composition of the NVOD offer. A server that generates 50 outlets, e.g., can not send the same , very requested film on all 50 outlets, but a plurality of copies of saod film must be loaded. The same, it is impossible to send 50 different films

each on one of the 50 different outlets, due to the limited capacity of the video server;

- analogic outlet: the use of conventional video servers in digital broadcasting ambients, where the signal is sent in MPEG-2 format, has the further disadvantage that it requests a real time encoder MPEG-2 for each outlet, in addition to a number of multiplex depending from the number of channels to be broadcasted. These apparatuses are enormously expensive.

It is the aim of the present invention to supply a determined number of video outlets (analogic, digital, MPEG2) independent one from the other and corresponding to the content of as much DVD loaded in the readers.

The aim set forth is reached by means of the device according to the present invention, that makes use of DVD disks as a support for the storage of the films, while the different storage technology used allows to solve the problems shown by the conventional video servers when they are used for the realization of a NVOD service.

The device according to the present invention solves the disadvantages of the conventional servers and shows further advantages:

- inexpensiveness: the use of the DVD technology for the storage of the films to be broadcasted allows a considerable saving with respect to the magnetic disks. This allows to realize systems with

a much greater capacity than the one of the systems based on hard-disks, and thus to solve the problems arising from a reduced capacity;

- quick loading of the contents: the capacity of the robotized record may reach 10,000 DVD, maintaining a maximum loading time of the DVD inside the readers of 7 seconds. Even without reaching such dimensions of the record, it is however possible to automatically update the content, replacing up to 100 DVD contemporarily in less than one hour;
- flexibility of use: the possibility of having in line an enormously greater number of films than the one used for broadcasting, together with the possibility of very quickly updating the content of the record, allow to realize extremely flexible programming and, when the number of users is not very high, also makes possible VOD-like applications. The record composition mix may be quickly adapted to the requests of the users by loading a plurality of copies of the most requested films;
- analogic and/or digital outlet: the proposed system may supply - according to the utilization ambient - a standard analogic outlet or a non-compressed digital one, as well as - in case of digital television - directly supply in output a compressed digital outlet MPEG-2 in singles or multiple program transport stream format, according to the DVB standard. This latter outlet allows to eliminate the need of the real time encoders MPEG-2, allowing further saving;
- a modular and expandible architecture: the structure of the proposed system is extremely modular and may be fitted from

time to time to the needs of the user, choosing the capacity of the record, the number of the readers, the number and the kind of the outlet cards. These parameters may also be modified in time for getting fitted to new arising needs.

The present invention will be described more in detail relating to the enclosed drawings in which an embodiment is shown.

Figure 1 shows a block scheme of an automatic device for the delivery of video signals with high capacity optical disks record, according to the present invention.

Figure 2 shows a functioning scheme.

Figure 3 shows a digital outlet module, while figure 4 shows an analogic outlet module.

The enclosed figures show a device based on a robotized system 1 for managing a DVDs 2, responsible for the recording of films to be broadcasted and of their loading in DVD 3 readers which transfer the content 4 of the DVDs - a film in MPEG-2 format for each DVD - towards an output module 5 consisting of cards which, according to the use of the outlets, multiple a plurality of MPEG flows into one or more transport stream MPEG2 in accordance with the specifications of Digital Video Broadcasting, or transform each MPEG flow into a corresponding standard

analogic outlet (compound, component or digital non compressed signal D1), while the check system 6 coordinates the operations of the different components of said system and realized an interface with possible other scheduling or check systems.

In the schemes shown in figures 2, 3 and 4, the following details are shown in addition to the ones already mentioned:

- a robot 7;
- a system for the mechanical transfer 8;
- an outlet 9 for the high speed video net data systems;
- a control inlet 10 from external systems; outlet of the state signals;
- a data net 11 of the kind TCP/IP;
- a system 12 for managing the high speed signal;
- a divider commutator 13 of the sent signals;
- an converter 14 of the sent signals to the features defined by the checking units;
- a unit 15 for the recombination of the signal (MUX);
- an inlet 16 from readers DVD;
- an outlet signal 17 towards the broadcasting apparatuses; digital video signal in MPEG-2 format;
- an inlet/outlet 18 of the checking signals coming from the central control and checking system;
- control data 19 onto the status of the system, sent to external monitoring systems;
- a unit 20 for decoding the digital MPEG-2 signal;
- an analogic outlet unit 21;



- an outlet signal 17' from the broadcasting apparatuses.

In the following, the functions of the blocks composing the system will be described more in detail: a robotized system 1 for managing DVD 2, responsible for the recording of the films to be broadcasted and for their loading in the DVD 3 readers which transfer the content 4 of the DVDs - a film in MPEG2 format for each DVD - towards the output module 5 consisting of cards which, according to the use of the outlets, multiple a plurality of MPEG flows into one or more transport stream MPEG2 in accordance with the specifications of Digital Video Broadcasting, or transform each MPEG flow into a corresponding standard analogic outlet (compound, component or digital non compressed signal D1), while the check system 6 coordinates the operations of the different components of said system and realized an interface with possible other scheduling or check systems.

- A robotized record DVD 1, that stores and mechanically manipulates a great number of DVD disks (up to 10,000). The use of this system eliminates all manual operations of loading from cassettes or tapes, with a consequent saving of time and money.
- DVD 3 readers, automatically managed by the control system 6, that allow to read the content of the DVDs and to transfer the same towards the outlet cards. The films are recorded on DVDs in single program transport stream format according to the DVB

specifications, and therefore the outlet data flow contains the video in MPEG2 format, one or more audio channels linked thereto and possible teletext or data channels.

- An outlet module 5 that integrates in a suitable way the cards for a non-compressed analogic/digital-like outlet and cards of the standard multiplex MPEG2 DVB kind.
- Cards for a non-compressed analogic and digital outlet, which convert the flow coming from the DVD readers into a standard television signal of the kind of PLA or NTSC, according to the features of the recorded video. The outlet of the card may be synchronized with other video signal sources (genlockable) and is usually supplied in compound, as an optional in components and in non-compressed digital.
- A card for digital MPEG-2 outlet, that doesn't convert the flow MPEG-2 coming from the readers, but combines a plurality of flows containing one single film (single program transport stream) into one single outlet flow containing all films (multiple program transport stream). The outline of the card and the combinations of the flows are managed by the control system, according to the needs of the user. The outlet flow is supplied in a LVDS or ASI interface, as specified by the DVB standard.
- A control system 6, that controls and synchronizes the functioning of all components of the system, having one single

external control interface. Therefore, the whole system is run through the control system, locally by means of a graphic interface or by a remote control on a serial or network interface. The control system has a record for storing the content of the DVDs present in the system so as to perform its control and coordination functions. Said record is automatically updated each time DVDs are loaded or cancelled from the system. Said record allows the search of the titles for broadcasting: once the titles is selected, the corresponding DVD is loaded in the reader. From this moment on the title may be broadcasted in outlet through the output cards. Also more complex operations are possible, like fast forward, pause, slow motion, fast backward, positioning to a specific time-code.

In consideration of the fact that, as above mentioned, the aim of the system is to supply a plurality of video outlets, of different kinds, independent one from the other and corresponding to as much DVDs loaded in the readers, the presence of further surrounding functions seems to be required for realizing this particular function, and they are grouped according to their single components as follows:

- robotized DVD 1 record: it has an external interface and all running and monitoring functions are run by the control system:
  - general outline and calibration;
  - communication about the status of the system;
  - loading of new DVDs into the robotized record;

- cancelling of DVDs from the robotized record;
- list of DVDs present;
- status of DVDs present;
- positioning of the DVD X in the reader Y;
- number of disks present;
- number of hours used;
- entry statistics;
- readers DVD 3, which don't have an external interface, and wherein all running and monitoring functions are managed by the control system, having the following functions:
  - play
  - stop
  - pause
  - fast forward / backward
  - slow motion
  - repeat
  - opening of loading wing
  - closing of loading wing
  - communication about the status of the system;
- an outlet module 5 that integrates in a suitable manner the outlet cards of the non-compressed analogic/digital kind and of the standard multiplex MPEG2 DVB kind.

The functions performed by the different kinds of card are:

- cards for non compressed analogic and digital outlet;
- conversion of the flow from reader X onto a compound outlet;
- conversion of the flow from reader X onto components outlet;
- conversion of the flow from reader X onto digital outlet;

- communication about the status of the system;
- cards for MPEG-2 outlet
  - inlet flow selection
  - definition of the parameters for the inlet flows
  - definition of the parameters for the outlet flow
  - communication about the status of the system;
- a control system 6 that manages and synchronizes the functioning of all components of the system and that has one single external interface; consequently, the control system must be able to send all orders relative to the functions available in the different under-systems and possibly to translate the orders coming from outside into orders intelligible by said under-systems. E.g.: an order coming from outside might be: 'You will send film X to outlet Y'. This order must be converted in the following sequence of controls:
  - search of film X
  - open the door of reader Z
  - load the relative DVD into said reader Z
  - close the door of reader Z
  - play reader Z
  - select input Z onto outlet Y.

For performing this complex function, the control system must also be able to run and to signal possible error situations due to bad working or to wrong orders.

The main functions of the control system are:

- search of the titles
- updating of the contents of the record

- outline of the different under-systems
- control and communication about the status of the different under-systems
- control and communication about its own status
- interpretation of the orders from interface of local control
- interpretation of the orders from interface of remote control by means of serial
- interpretation of the orders from interface of remote control by means of LAN network
- performing of the program for locale interface.

## CLAIMS

1. An automatic device for the delivery of video signals with a high capacity optical disks record, *characterized in* a robotized system (1) for running DVDs (2) responsible for the recording of the films to be broadcasted and of their loading into the readers DVD (3), which transfer the content (4) of the DVDs - a film in MPEG2 format for each DVD - towards the output module (5) consisting of cards which, according to the use of the outlets, multiple a plurality of MPEG flows into one or more transport stream MPEG2 in accordance with the specifications of Digital Video Broadcasting, or transform each MPEG flow into a corresponding standard analogic outlet (compound, component or digital non-compressed signal D1), while the check system 6 coordinates the operations of the different components of said system and realized an interface with possible other scheduling or check systems.
2. A device according to claim 1, *characterized in* a robotized record DVD (1) for storing and mechanically manipulating a great number of DVD disks (up to 10,000); the use of said system eliminates all manual loading operations from cassettes or tapes with the consequent saving of time and money.
3. A device according to claim 1, *characterized in* a plurality of readers DVD (3), automatically run by said control system (6) and which allow to read the content of the DVDs and to transfer the same towards the outlet cards; the films are stored onto DVD in

single program transport stream format according to the specifications of DVB, and therefore the outlet data flow contains the video in MPEG2 format, with one or more audio channels linked thereto and possible teletext or data channels.

4. A device according to claim 1, *characterized in* an outlet module (5) which suitably integrates the non-compressed analogic/digital kind outled cards and the standard multiplex MPEG2 DVB-like cards.
5. A device according to claim 1, *characterized in* a plurality of cards for non-compressed analogic and digital outlet, which convert the flow coming from DVD readers into a standard television signal of the kind PAL or NTSC, according to the features of the stored video; the outlet of the card may be synchronized with other sources of the video signal (genlockable) and is usually supplied in compound, as an optional in components and in non-compressed digital.
6. A device according to claim 1, *characterized in* a card for digital outlet MPEG-2, that does not convert the MPEG-2 flow coming from the readers but combines a plurality of flows containing one single film (multiple program transport stream); the outline of the card and the combination possibilities of the flows are run by the control system, according to the needs of the user; the outlet flow is supplied on LVDS or ASI interface, as it is specified in the DVB standard.



7. A device according to claim 1, *characterized in* a control system (6) that manages and synchronizes the functioning of all components of the system and that has one single external control interface; therefore, the whole system is run by the control system, locally by means of a graphic interface and in remote control by sending orders onto a serial or network interface; the control system has a record for storing the content of the DVDs present in the system, for performing its functions of control and coordination; said record is automatically updated each time DVDs are loaded or cancelled from the system; furthermore, said record allows the search of the titles for broadcasting; once a title has been selected, the corresponding DVD is loaded into the reader; from this moment on, the title may be sent into outlet through the output cards; also more complicated operations are possible, like fast forward, pause, slow motion, fast backward and positioning to a determined time-code.

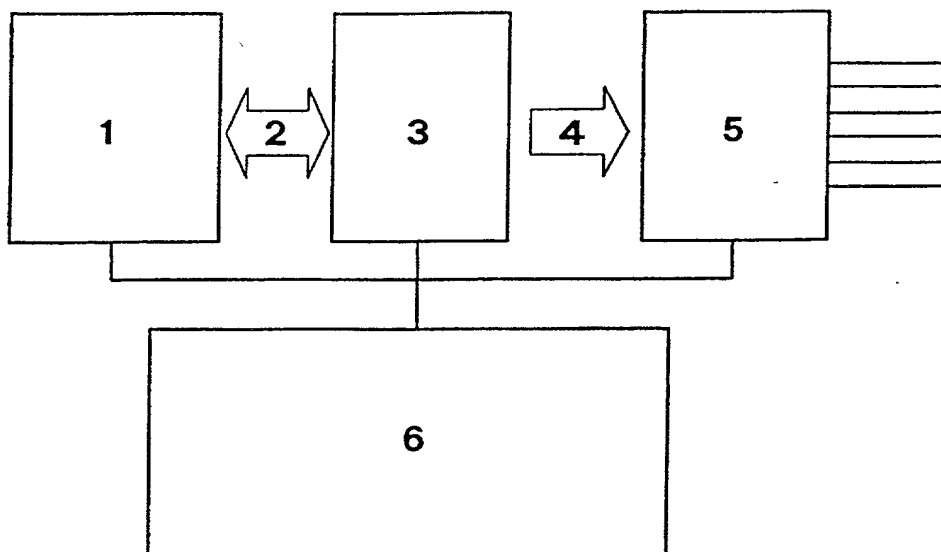


FIG. 1

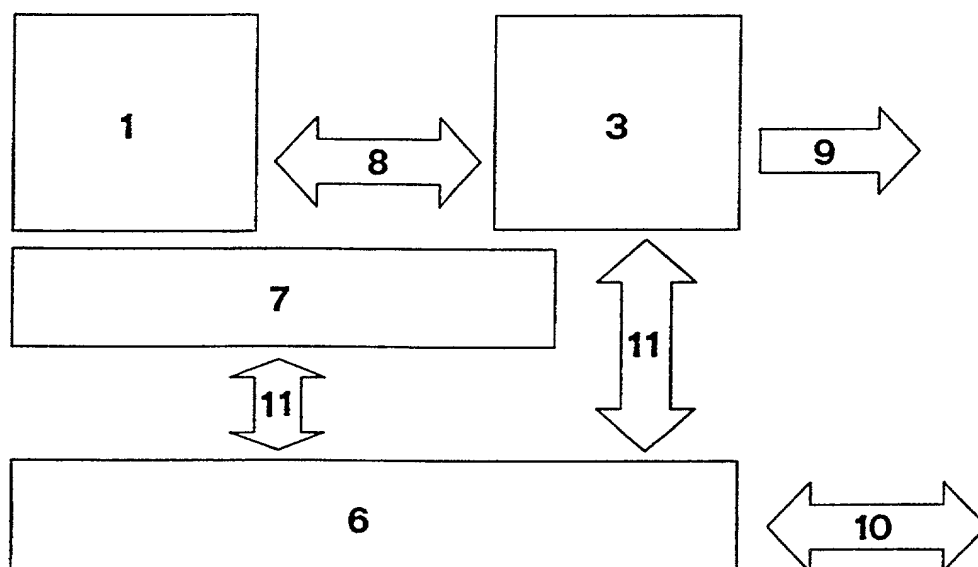


FIG. 2

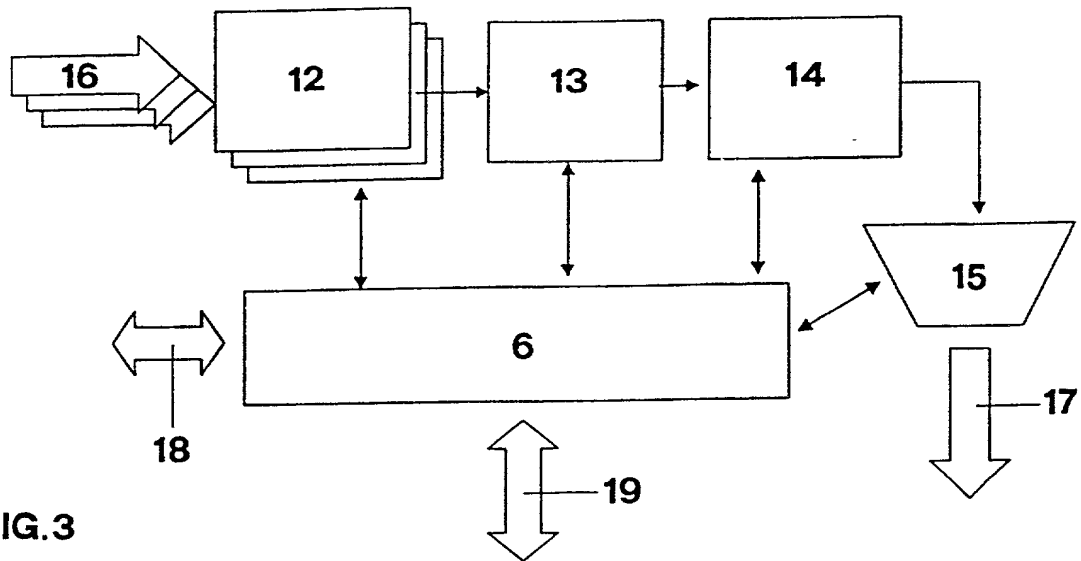


FIG. 3

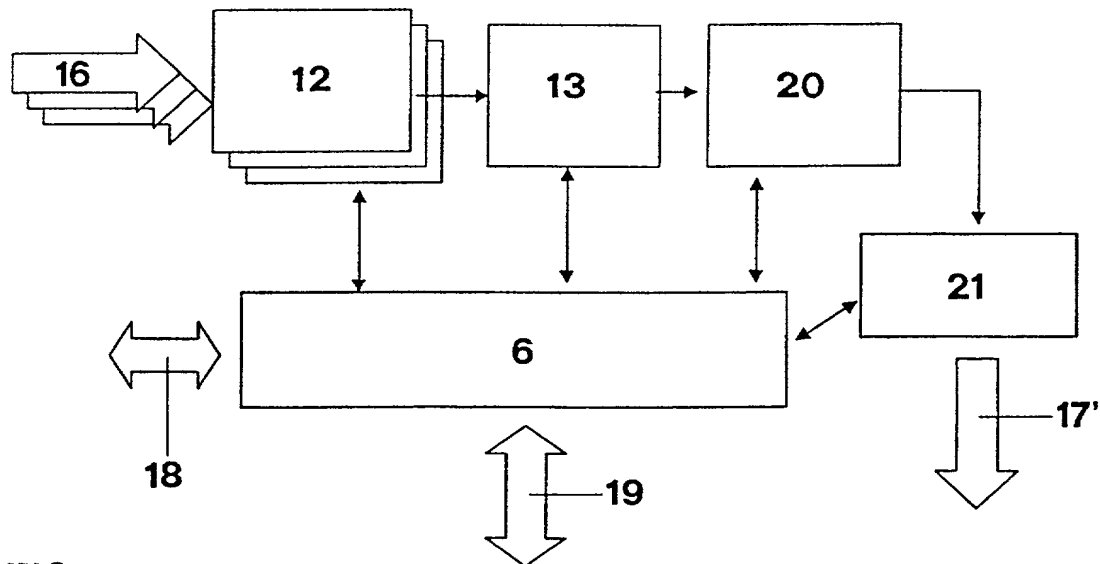


FIG. 4

Ref. 2182 US

## COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

### AUTOMATIC DEVICE FOR THE DELIVERING OF VIDEO SIGNALS, WITH A HIGH CAPACITY OPTICAL DISKS RECORD

the specification of which: *(check one)*

#### REGULAR OR DESIGN APPLICATION

- ☐ is attached hereto.
- ☐ was filed on \_\_\_\_\_ as application Serial No. \_\_\_\_\_  
and was amended on (if applicable).

#### PCT FILED APPLICATION ENTERING NATIONAL STAGE

- ☒ was described and claimed in International application No. PCT/IT99/00085 filed on 9 April 1999 and as amended on (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

#### PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

#### PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
Italy	RM98A000686	2 November 1998	yes

*(Complete this part only if this is a continuing application.)*

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status--patented, pending, abandoned)

07/07/2000 20:17 408-558-1911  
12.42 33-5-507/0366SYSTEMUS  
SYSTEM S.P.A.PAGE 03/03  
PAG 03

## POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from Prof. Dott. Alessandro Mascioli as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the registered patent attorneys represented by Customer No. 000466 to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, including: Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoit CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, Thomas W. PERKINS, Reg. No. 33,027, and Roland E. LONG, Jr., Reg. No. 41,949.

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00466

PATENT, TRADEMARK OFFICE

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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(given name, family name)

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ITV

Full name of second joint inventor, if any: Mario MENE' [Signature]  
(given name, family name)

Inventor's signature X [Signature]

Date 11.07.00

Residence: Roma, Italy

Citizenship: Italian

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ITV